Electronic Version

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Claims

[c1] 1. A method for starting-up a motor having multiple stator windings and a rotor, comprising:
providing a current to two of the windings to excite a predefined initial phase and allowing one of the windings to be floating;
monitoring a value of a back electromotive force (BEMF) induced in the floating winding;
commutating to a subsequent phase, which is adjacent to the predefined initial phase in a predetermined sequence of excitation phases, if a zero-crossing point of BEMF in the floating windings occurs in the floating winding within a maximum startup time; and
commutating to a shifted subsequent phase, which is functionally shifted by two phase-intervals from the predefined initial phaseif no zero crossing point of BEMF occurs in the floating winding within the maximum startup time.

[c2] 2. The method of claim 1, between the step of providing the current and the step of monitoring the BEMF, further comprising a step of masking an interval time period, which is sufficiently long to avoid a parasitic BEMF detec-

tion.

[c3] 3. The method of claim 1, after the step of commutating to the shifted subsequent phase, further comprising a step of continuing to supply successive phases of the windings with current in the predetermined sequence to maintain rotation of the motor.

[c4] 4. The method of claim 1, wherein the predefined initial phase is one excited phase selected from the group consisting of AB_, AC_, BC_, BA_, CA_, and CB_.

[c5] 5. The method of claim 4, wherein in the step of commutating to the subsequent phase, a level change of the BEMF is also detected.

[c6] 6. A method for starting-up a motor having multiple stator windings and a rotor, comprising:
providing a current to a first winding and a second winding to excite a predefined initial excitation phase and allowing a third winding to be floating;
masking a time period to reach a state with reduced parasitic detection;
commutating to a next first excitation phase, which is adjacent to the predefined initial excitation phase in a predetermined sequence of excitation phases, if a zero-crossing point of BEMF for the third winding occurs in

the third winding within a maximum startup time;
commutating to a next second excitation phase after commutating to the next first excitation phase when a zero-crossing point of BEMF of the second winding has been detected;
commutating to a next third excitation phase, which is functionally shifted by two phase-intervals from the pre-defined initial excitation phaseif no zero crossing point of BEMF of the third winding occurs in the third winding within the maximum startup time; and
commutating to a next fourth excitation phase after commutating to the next third excitation phase when a zero-crossing point of BEMF of the first winding has been detected.

[c7] 7. The method of claim 6, wherein in the step of commutating to the next first excitation phase, a level change of the BEMF is also detected.

[c8] 8. The method of claim 6, wherein in the step of commutating to the next fourth excitation phase, the zero-crossing point is a negative-going zero-crossing point.

[c9] 9. The method of claim 6, wherein when the first, second, third windings are respectively denoted by A, B, and C, the predefine initial phase is the excitation phase AB_.

[c10] 10. The method of claim 9, wherein when the step of commutating to the second excitation phase or the step of commutating to the fourth excitation phase has finished, the method for starting-up then exits.

[c11] 11. The method of claim 9, wherein the predefined initial excitation phase is AB_, the next first excitation phase is AC_, the next second excitation phase is BC_, the next third excitation phase is BC_, and the fourth excitation phase is BA_.